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Phacellium brachybotrydis sp. nov. on *Brachybotrys paridiformis*

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Abstract – *Phacellium brachybotrydis* sp. nov., causing leaf discolorations of *Brachybotrys paridiformis*, was collected in Korea. The new fungus is described, illustrated, and compared with *Cercospora subhyalina*, recorded on the same host, as well as two morphologically similar *Phacellium* species, *P. gracilipes* and *P. dearnessii*.

Key words – cercosporoid fungus, *Mycosphaerellaceae*, taxonomy

Introduction

In the course of field surveys of phytopathogenic fungi carried out after the publication of a comprehensive taxonomic studies on *Cercospora* and the allied genera in Korea (Shin & Kim 2001), a cercosporoid hyphomycete associated with discolored lesions of *Brachybotrys paridiformis* was found. It is well-characterized by synnemata pigmented only at the base, colorless conidiogenous cells and conidia, and terminal to rarely pleurogenous conidiogenous cells. These features agree well with Braun's (1998) concept of *Phacellium* Bonord. The fungus is described, illustrated, and compared with related cercosporoid fungi.

Materials and methods

Fresh collections or herbarium specimens were used for morphological observations. A small piece of living tissue containing fungal structures was mounted in a drop of water for microscopic examinations. The dried specimens were rehydrated in 3% KOH solution and then observed. Measurement of conidiophores and conidia for each sample was made from 40–50 replicates at

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magnification of 400× and 1000× with an eye-piece micrometer under a light microscope (Olympus BX51), and images were photographed using a Zeiss Axio imager microscope. All dried specimens are housed in the herbarium KUS of the Korea University, Seoul, Korea.

Taxonomy

Phacellium brachybotrydis M.J. Park & H.D. Shin, **sp. nov.** Fig. 1–2

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Maculae inconspicuae, diffusae, flavidae vel olivaceae, margine indefinito. Conidiomata hypophylla, synnematalia, solitaria, primo pallida vel albida deinde rubella. Mycelium immersum; hyphae septatae, ramosae, hyalinae vel dilutissime olivaceae. Synnemata erecta, ex stromatibus substomatalibus oriunda, 90–200 × 15–40 µm, primo laxa, deinde aggregata, subcylindrica, ad basim rubro-brunnea vel brunnea, apicem versus pallidiora, interdum omnino pigmentosa; conidiophora 2–3 µm lata, septata, simplicia, laevia; cellulae conidiogenae terminales vel raro pleurogenae, subrectae vel interdum sinuosae, apice geniculato, hyalinae; cicatrices conidiales conspicuae, parvae, incrassatae, fuscae. Conidia catenata vel ramicatenata, cylindrica vel ellipsoidea, recta, hyalina, aseptata, interdum uniseptata, ad septum non constricta, verruculosa, utrimque obtusa vel subobtusa, 10–35 × 3–5 µm; hila incrassata, fuscata, non eminentia.

Etymology – The epithet refers to the genus name of the host.

Holotype – On living leaves of *Brachybotrys paridiformis* Maxim. (*Boraginaceae*), Korea, Chuncheon, 4 September 2008, M.J. Park & H.D. Shin (*KUS-F23641*).

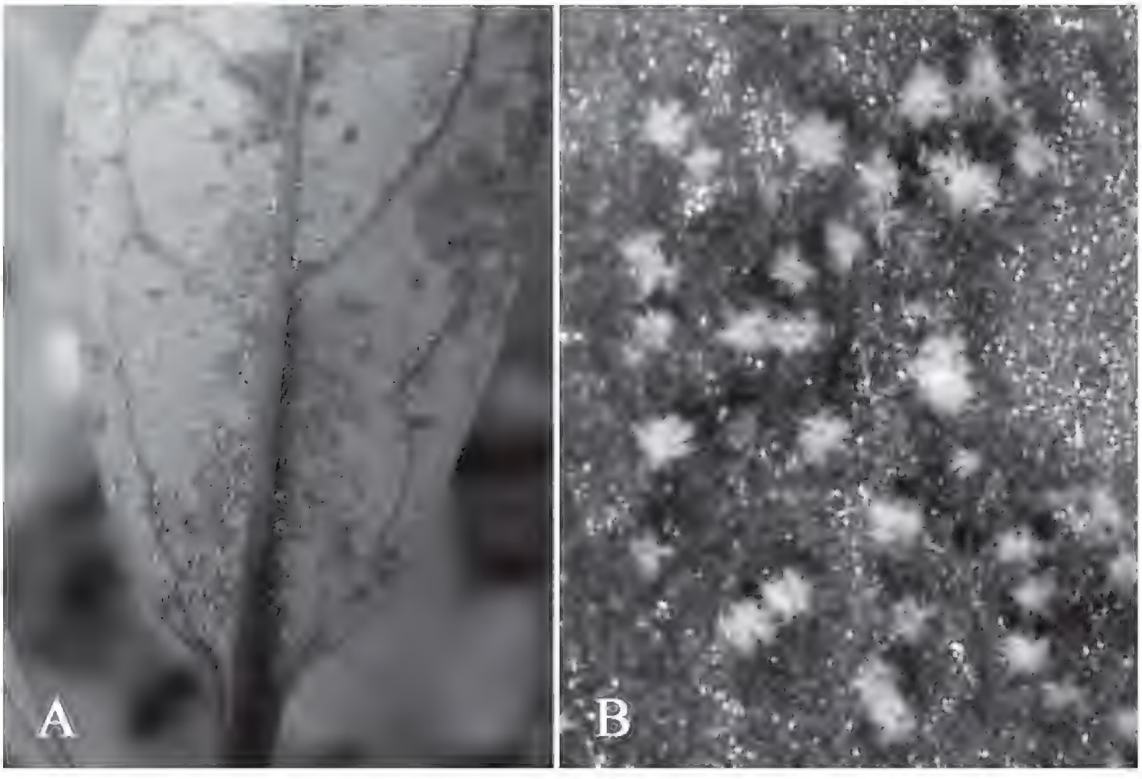

Fig. 1. A - The lower leaf surface of *Brachybotrys paridiformis* infected with *Phacellium brachybotrydis*. B - Close-up of leaf lesion.

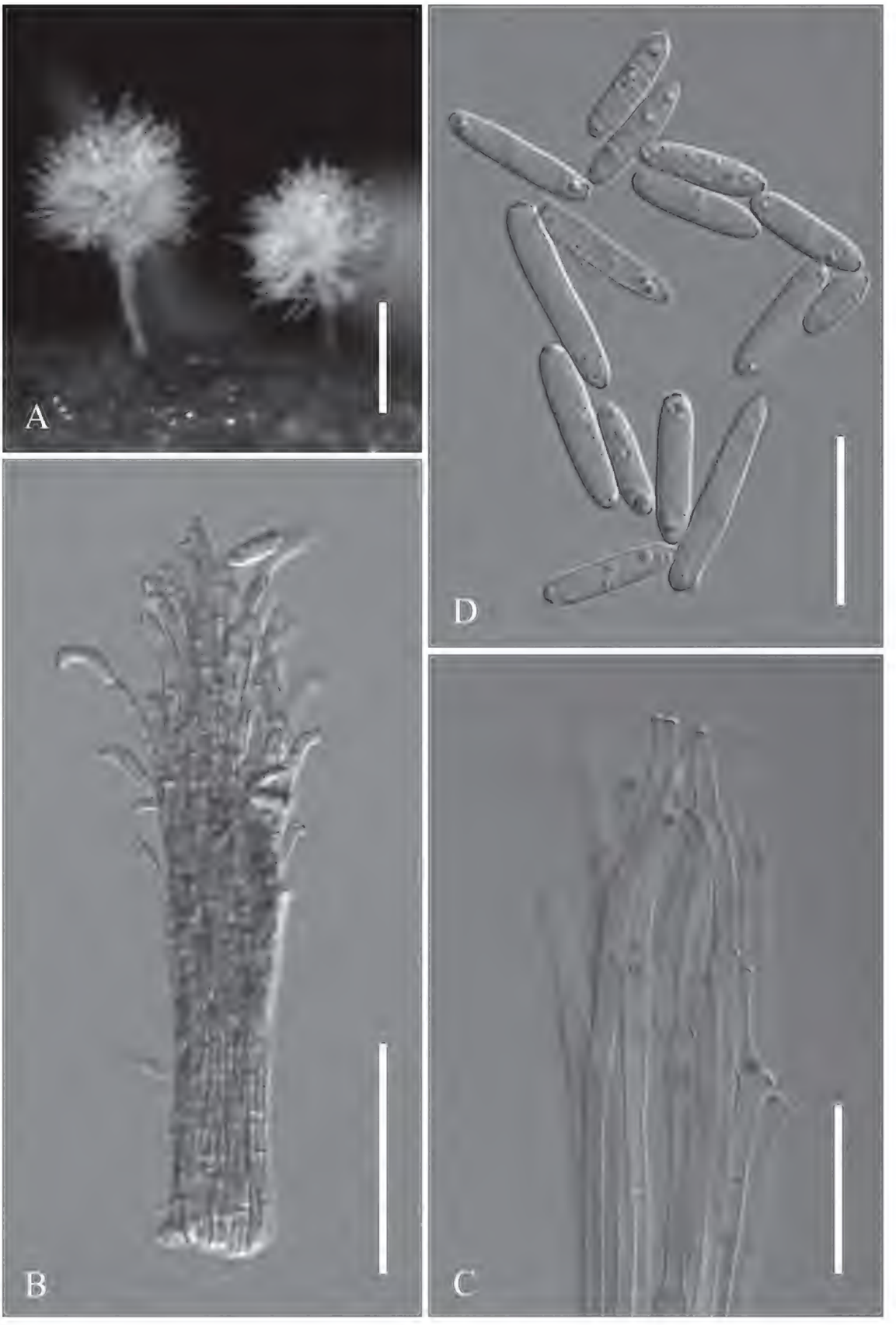

Fig. 2. *Phacellium brachybotrydis*: A - Tree-like synnemata; B - synnemata; C - Upper portion of conidiophores; D - Conidia. Scale bar: A = 100 µm, B = 50 µm, C & D = 20 µm.

Leaf spots inconspicuous, diffuse, yellowish to olivaceous discolorations, margin indefinite. Conidiomata hypophyllous, synnematous, solitary, at first pale to whitish, later pink. Mycelium internal; hyphae septate, branched, hyaline to faintly pigmented. Synnemata erect, arising from substomatal stromata, 90–200 × 15–40 µm, at first rather loose, but later densely aggregated, forming firm stalks, subcylindrical, composed of numerous compact parallel conidiophores, apically splaying out, reddish brown to brown at the base, paler towards the apex, sometimes pigmented almost throughout; individual conidiophores 2–3 µm wide, septate, simple, smooth; conidiogenous cells terminal as well as rarely pleurogenous, almost straight to partly sinuous, geniculate at the apex, hyaline or almost so; conidial scars conspicuous, small, thickened and darkened. Conidia catenate, sometimes in short branched chains, cylindrical to ellipsoidal, straight, hyaline, usually aseptate but occasionally uniseptae, non-constricted at the septa, verruculose, obtuse to subobtuse at both ends, 10–35 × 3–5 µm; hilum slightly thickened, darkened, and non-protuberant.

Additional Specimens Examined – Korea, Chuncheon, 24 August 2004, H.D. Shin (*KUS-F20648*); Korea, Hoengseong, 19 October 2008, M.J. Park & H.D. Shin (*KUS-F23853*).

Notes – Recently, as stated by Braun & Crous (2008), the taxonomic position of *Phacellium* within cercosporoid anamorphs of *Mycosphaerella* Johanson is not yet clearly confirmed. Thus, the genus concept of *Phacellium* as circumscribed by Braun (1998) is currently maintained and followed in the present study. Further studies on a molecular basis encompassing more isolates are needed to evaluate the taxonomic status and phylogenetic relationship of the genus *Phacellium* within anamorph genera of *Mycosphaerella*.

Only a single cercosporoid species, *Cercospora subhyalina* H.D. Shin & U. Braun (Braun 1995) was described on *Brachybotrys paridiformis* from Korea. It is clearly distinguished from the present fungus by having short, hyaline to subhyaline conidiophores (20–50 × 2–5 µm) and scolecosporous conidia (30–50 × 1.5–4.5 µm).

There is no comparable species possessing synnematous conidiophores found on species of the genus *Brachybotrys* or other genera in the *Boraginaceae*, as found in *Phacellium* and the allied genus *Tandonella* S.S. Prasad & R.A.B. Verma. Based on the morphology of conidia and conidiophores, the new fungus resembles two other *Phacellium* species — *P. gracilipes* (Davis) U. Braun on a host of the *Cornaceae* (Braun 1994) and *P. dearnessii* (Bubák) U. Braun on a host of the *Myricaceae* (Braun 1992). The new species on *Brachybotrys paridiformis* is characterized by verruculose conidia with obtuse ends and reddish brown synnemata. *Phacellium gracilipes* differs from *P. brachybotrydis* in having slightly longer (15–40 µm), almost smooth to verruculose conidia and

yellowish to pale brownish synnemata. *Phacellium dearnessii* is distinguished from *P. brachybotrydis* by its smooth to verruculose conidia with somewhat pointed ends and subhyaline to yellowish synnemata. In addition, compared to the conspicuous necrotic leaf spots produced by *P. gracilipes* and *P. dearnessii,* the new fungus forms inconspicuous leaf lesions appearing as yellowish to olivaceous discolorations. These differences support *P. brachybotrydis* as representing a new, undescribed *Phacellium* species on a host of the *Boraginaceae.*

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